Space Weather Forecast

Issued on Thursday, 20 July 2023 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Ongoing (S1) Solar Radiation Storm day 1 (20th). Minor/Moderate R1/R2 Blackouts likely throughout. Chance of G1/G2 (Minor/Moderate Storms) 20th and 21st.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate, with two Moderate-class flares observed, both of which were from the large and complex region which has now transited round the southwest limb to the far side. There are currently nine sunspot regions on the visible disc. The largest regions currently lie in northern hemisphere close to centre disc, however both of these regions have remained relatively stable with perhaps a reduction in complexity through the period. A complex region in the northeast has shown some Common-class activity during the period, but it too has shown some simplification recently. A large region continues to emerge around the northeast limb and will require further analysis as it comes further into view. All other regions on the disc remain small or simple with little change.

A Coronal Mass Ejection (CME) was observed leaving the west limb of the Sun in association with a Moderate flare at 19/1725 UTC. It is currently being modelled but is thought unlikely to be Earth directed. No other Earth directed CMEs were observed in the available imagery.

Solar Wind / Geomagnetic Activity: The solar wind parameters are indicative of a gradual return to a slow regime. The solar wind slowly declined from around 480 to 400km/s. The Interplanetary Magnetic Field has been weak, with its important north-south component mostly orientated weakly northward. This resulted in Quiet geomagnetic activity (Kp 0-2).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10MeV), as observed by GOES16, is displaying a slight declining trend but remained just above the Minor (S1) Storm threshold following the Moderate flare that occurred 18/0000UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is expected to be Moderate over the following days, with isolated Moderate-class flares likely and a slight chance of a Strong-class flare.

Solar Wind / Geomagnetic Activity: Two Earth-directed CMEs feature in this forecast, with glancing blows possible on Day 1 (20th) and another one on Day 2 (21st). However, confidence is very low with regards to the strength and timing of the second CME. Connections with coronal hole fast winds may become established at times but these are small and most likely to be masked by CME effects. Solar winds are likely to become elevated and perhaps strong at times on Days 1 and 2, before slowly easing on Days 3 and 4.

Quiet geomagnetic activity is likely to become Active on Day 1 (20th) with a chance of G1/G2 (Minor/Moderate) storms intervals into Day 2 (21st). Activity returning to mainly Quiet with a chance of Unsettled intervals through Day 3 (22nd), as CME effects wane.

Energetic Particles / Solar Radiation: The current ongoing minor (S1) solar radiation storm will likely to continue to decline if no further significant proton rich flares are emitted, dropping below the S1 threshold on day 1 (20th).

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	30	10	1
Strong	G3	No	10	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	90	40	20	20
Very Active	≥ S3 *	No	5	5	5	5

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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